WHAT IS CLAIMED IS:

1. An acoustic transducer for measuring a property of a fluid, the acoustic transducer comprising:

an acoustic pulse generator; and

a buffer assembly between the pulse generator and the fluid, the buffer assembly being composed of a core and a sleeve shrink fitted over the core to form a cladding that reduces dispersion of the acoustic pulses traveling through the core.

2. The acoustic transducer of claim 1 wherein the sleeve has a thermal conductivity of at least 15 W/(m·K).

3. The acoustic transducer of claim 1 wherein the sleeve is made of titanium.

4. The acoustic transducer of claim 1 wherein the core has a thermal conductivity of less than 15 W/(m·K).

5. The acoustic transducer of claim 1 wherein the core has a thermal conductivity of less than 1 W/(m·K).

6. The acoustic transducer of claim 1 wherein the core is made of fused silica.

7. The acoustic transducer of claim 6 wherein the core is made of a composite of fused silica and mica.

8. The acoustic transducer of claim 1 wherein the sleeve is secured to the core by high temperature glass fusing.

9. The acoustic transducer of claim 1 wherein the high temperature glass fusing of the sleeve and core forms a hermitic seal.

10. The acoustic transducer of claim 1 wherein the sleeve is secured to the core with a refractory cement.

11. The acoustic transducer of claim 1 wherein the sleeve is made of metal.

12. The acoustic transducer of claim 1 further comprising:

a thermal management system mounted to the sleeve to transfer heat from the sleeve, wherein the thermal management system is formed of a high thermal conductivity material and is arranged along the sleeve such that substantial heat is transferred to the environment from the thermal management system without excessive temperature increase at the pulse generator.

13. The acoustic transducer of claim 12 wherein the thermal management system includes a plurality of fins.

14. The acoustic transducer of claim 1 wherein the sleeve is made of a material having a bulk sound speed greater than a bulk sound speed of the core material.

15. The acoustic transducer of claim 1 wherein the sleeve is made of a material having a bulk sound speed less than a bulk sound speed of the core material, and wherein the sleeve is configured in a way that adds stiffness thereto.

16. The acoustic transducer of claim 1 wherein during operation at least a portion of the core extends into the fluid which is being measured and wherein the sleeve is arranged to insulate the sides of the extended core portion from heat from the fluid while leaving the tip of the core in contact with the fluid such that the insulated core portion is not cladded.

17. The acoustic transducer of claim 1 wherein the insulated portion of the core sides is insulated by an air gap formed by the sleeve.

18. In combination with an apparatus including a conduit through which fluid flows, the improvement comprising:

an acoustic transducer for measuring a property of a fluid, the acoustic transducer including an acoustic pulse generator and a buffer assembly between the pulse generator and the fluid, the buffer assembly being composed of a core formed of a low thermal conductivity material and a sleeve shrink fitted over the core to form a cladding that reduces dispersion of the acoustic pulses traveling through the core.

19. The combination of claim 18 wherein the sleeve is secured to the core by high temperature glass fusing.

20. The combination of claim 18 wherein the sleeve is secured to the core with a refractory cement.

21. The combination of claim 18 wherein the sleeve is made of metal.

22. The combination of claim 18 further comprising:

a thermal management system mounted to the sleeve to transfer heat from the sleeve, wherein the thermal management system is formed of a high thermal conductivity material and is arranged along the sleeve such that substantial heat is transferred to the environment from the thermal management system without excessive temperature increase at the pulse generator.

23. The combination of claim 22 wherein the thermal management system includes a plurality of fins.

24. The combination of claim 18 wherein during operation at least a portion of the core extends into the fluid which is being measured and wherein the sleeve is arranged to insulate the sides of the extended core portion from heat from

the fluid while leaving the tip of the core in contact with the fluid such that the insulated core portion is not cladded.

25. The combination of claim 18 wherein the insulated portion of the core sides is insulated by an air gap formed by the sleeve.

26. A sampling system comprising:

a fluid inlet for receiving a fluid;

a dilution inlet for receiving a dilution gas;

a mixing section for mixing at least a portion of the fluid with the dilution gas;

a collection section for collecting a sample of the mixture; and

a flow meter for measuring a flow related to the sampling system, the flow meter including an acoustic transducer for measuring the flow, the acoustic transducer including an acoustic pulse generator and a buffer assembly between the pulse generator and the fluid, the buffer assembly being composed of a core formed of a low thermal conductivity material and a sleeve shrink fitted over the core to form a cladding that reduces dispersion of the acoustic pulses traveling through the core.

27. The sampling system of claim 26 wherein the flow meter includes a pair of acoustic transducers arranged in an opposed fashion in a conduit through which fluid flows for measuring the flow.

28. A sampling system comprising:

a sample line for sampling a fluid from a main conduit;

a flow meter for measuring a flow of the fluid through the main conduit, the flow meter including an acoustic transducer for measuring the flow, the acoustic transducer including an acoustic pulse generator and a buffer assembly between the pulse generator and the fluid, the buffer assembly being composed of a core formed of a low thermal conductivity material and a sleeve shrink fitted over the core to form a cladding that reduces dispersion of the acoustic pulses traveling through the core;

a dilution inlet for receiving a dilution gas;

a mixing section for mixing the fluid flow from the sample line with the dilution gas at a generally fixed ratio;

a collection section for sampling the mixture, the mixture being sampled at a rate generally proportional to the flow of the fluid through the main conduit

29. The sampling system of claim 26 wherein the flow meter includes a pair of acoustic transducers arranged in an opposed fashion in the main conduit.